



12th & 13th April 2018

Royal College of Physicians, London

Biodynamics 2018 Organising Committee:

Mark Richardson

Zoran Cvetkovic

Franca Fraternali

Kevin O'Byrne

Steven Niederer

Ivana Rosenzweig

PROGRAMME

Thursday 12th April

08:00 - 09:00	Registration + tea/coffee	Lower Hall and Platt Room
09:00 - 09:15	Welcome and opening remarks	Seligman Lecture Theatre

Motor Neuroscience

Chair: Professor Zoran Cvetkovic

Unravelling mechanisms of movement control and how they are disrupted in individuals with movement disorders requires holistic interdisciplinary approaches.

This session represents an overview of the field and recent research advances in computational motor control, motor neurophysiology, brain networks and clinical neurophysiology, aiming to spur some new synergies in this very complex and exciting field.

09:15 - 10:15	Keynote: How motoneurons work and what happens when they go wrong Kerry Mills, King's College London	
10:15 - 10:45	Architecture of a network in the cerebellum as a learning machine Reza Shadmehr, Johns Hopkins University	
10:45 - 11:15	Aberrant synchronisation in Parkinsons and Tremor; leveraging recent findings to develop more selective therapies Peter Brown, University of Oxford	
11:15 - 11:45	What determines when a movement starts? John Rothwell, University College London	
11:45 - 12:00	Highlighted oral Control of dynamics revealing a key role of frontal lobes in generating generalised spike and wave discharge Chayanin Tangwiriyasakul, King's College London	
12:00 - 13:00	Lunch + posters	Platt Room

Molecular Mechanisms and Modelling of Diseases

Chair: Professor Franca Fraternali

Progresses in Translational Medicine will have to proceed hand-in-hand with the discovery of the molecular mechanisms underlying the cell pathological states. Dissecting these, together with the introduction of molecular diagnostics into medical practice, will result essential in the annotation of disease pathogenesis and in the design of tailored and effective patient treatments.

This workshop will be dedicated to highlight some of the recent discoveries of molecular mechanisms playing a role in neurodegenerative disorders and cancer. We will highlight the importance of biophysical, analytical and computational tools in assessing and quantifying these mechanisms.

13:00 -14:00	Keynote: Constitutional Dynamics of Prion Assemblies Human Rezaei, French National Institute for Agricultural Research	
14:00 - 14:30	Protein dynamics impact on drug discovery Bissan Al-Lazikani, Institute of Cancer Research, London	
14:30 - 15:00	Building the global map of human protein complexes Kevin Drew, University of Texas	
15:00 - 15:30	Protein homeostasis of a metastable subproteome associated with Alzheimer's disease Michele Vendruscolo, University of Cambridge	
15:30 - 16:00	Break + refreshments + posters	Platt Room

Neural Oscillations in Health and Disease

Chair: [Dr Ivana Rosenzweig](#)

The emerging field of neuronal oscillations provides an exciting interdisciplinary platform that cuts across physics, neuroscience, neuromodulation, sleep medicine, psychology, biophysics, computational modelling and mathematics. Mammalian cortical neurons form oscillating networks of various sizes, and resulting neural oscillations are known to be phylogenetically preserved, and likely functionally relevant. This session will provide an overview of the recent research advances in understanding their physiological mechanisms and functions, as well as highlight some possible ground-breaking possibilities, which neuromodulation might provide for the diagnosis and treatment of brain disorders.

16:00 - 17:00	Keynote: Successful or unsuccessful interventions? The role of cortical oscillations Roi Cohen Kadosh, University of Oxford	
17:00 - 17:30	Deep Learning for Brain Signals Tonio Ball, University of Freiburg	
17:30 - 18:00	Transcranial alternating current and random noise stimulation in healthy and disease Andrea Antal, University of Gottingen	
18:00 - 18:30	Long-Range Temporal Correlations in Neuronal Oscillations Vadim Nikulin, Max Planck Institute, Leipzig	
18:30 - 19:30	Drinks reception and posters	Platt Room

PROGRAMME

Friday 13th April

08:30 - 09:15	Registration + tea/coffee	Lower Hall and Platt Room
09:15 - 09:30	Welcome and opening remarks	Seligman Lecture Theatre

Stress and the Brain

Chair: Professor Kevin O'Byrne

Stress has deleterious effects on the brain including dynamic morphological changes that impact on various key functions including cognition and memory, mental health and fertility. This symposium will focus on mathematical modelling and function of dynamic glucocorticoid and reproductive hormone secretion, neuroplastic adaptations of stress neurocircuits, and the role of chemosensory communication in promotion of stress-adaptive behaviours that may aid our survival.

09:30 - 10:30	Keynote: No stress without rhythm; the world of oscillating hormones Stafford Lightman, University of Bristol	
10:30 - 11:00	Dynamics of Brain Stress Circuit Integration James Herman, University of Cincinnati	
11:00 - 11:30	Chemosensory communication of stress Bettina Pause, University of Dusseldorf	
11:30 - 12:00	Tuning the reproductive hormonal signals: insights from a mathematical model Margaritis Voliotis, University of Exeter	
12:00 - 12:15	Highlighted oral Background EEG networks capture the time-course of epileptogenesis Piotr Slowinski, University of Exeter	
12:15 - 13:30	Lunch + posters	Platt Room

Patient Specific Modelling

Chair: Dr Steven Niederer

Computational models provide a mathematical framework for integrating data from an individual patient and interpreting it within the context of known physical laws and physiology. Patient specific models can then be used to analyse an individual patient to identify the mechanisms underpinning their pathology, to provide inferred measurements such as muscle stress or work, or to predict how a patient will respond to a therapy.

This session will provide a broad review exemplar applications of computational modelling across the fields of muscle-skeletal, cardiac, cardiovascular and drug delivery.

13:30 - 14:30	Keynote: The snowflake conundrum: lessons in paediatric musculoskeletal biomechanics Marco Viceconti, University of Sheffield
14:30 - 15:00	Patient specific modelling for planning treatment in congenital heart disease Silvia Schievano, University College London
15:00 - 15:30	Arrhythmogenic Cardiomyopathy: from Simulations to Patient Stratification Joost Lumens, Maastricht University
15:30 - 16:00	Physiologically-based modelling of bile-acid metabolism Lars Kuepfer, Rwth-Aachen University
16:00	Closing remarks

